Large-Volume Samplers for Efficient Composite Sampling and Particle Characterization in Sewer Systems

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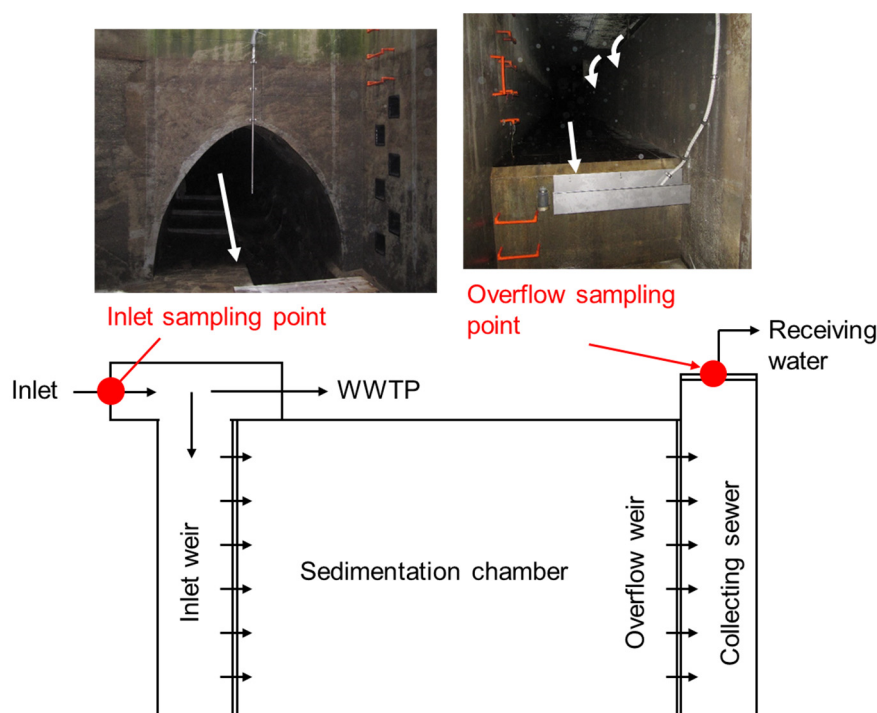*   Correspondence: nickel@kit.edu (J.P.N.), stephan.fuchs@kit.edu (S.F.)

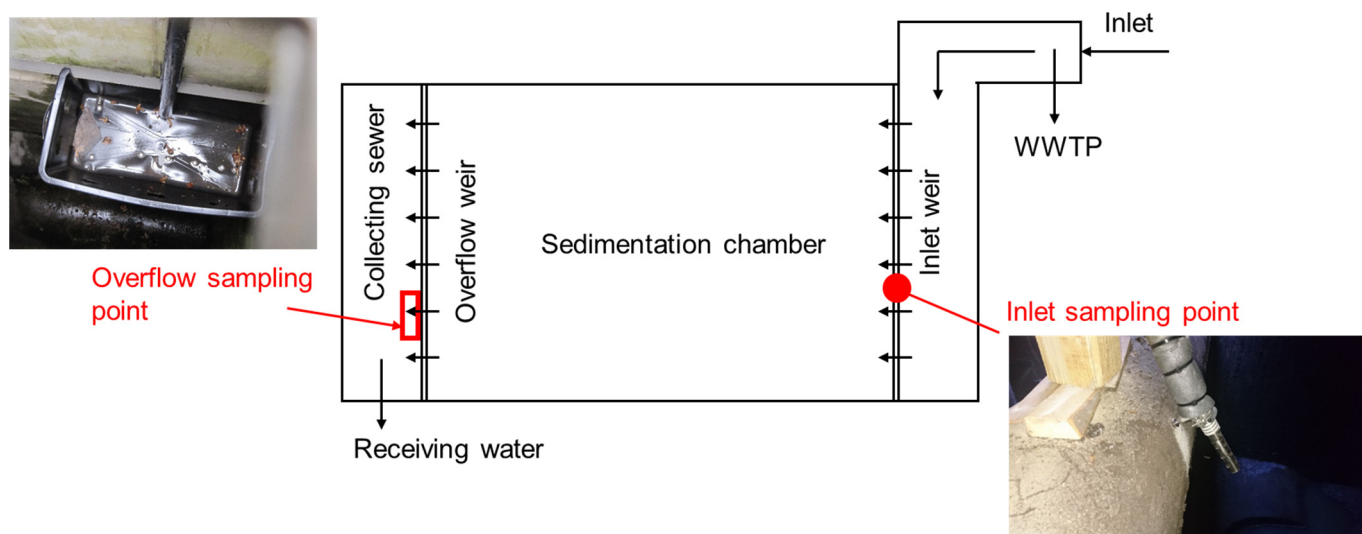**Figure S1.** Sketch of CSO facility SED06 with sampling points.

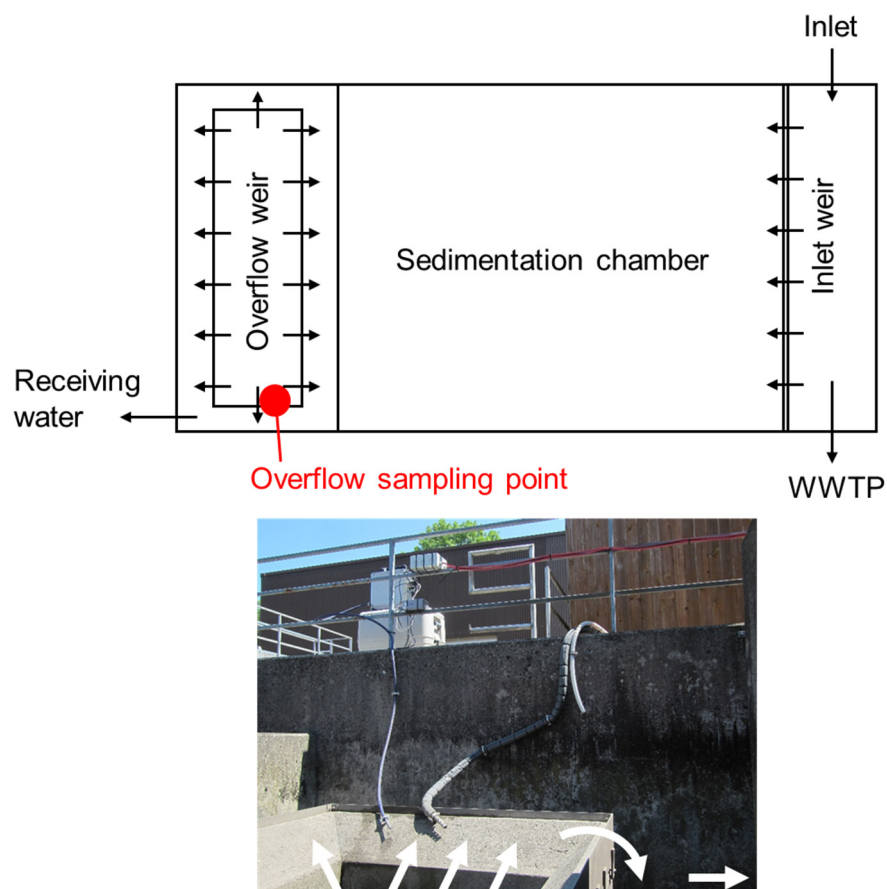**Figure S2.** Sketch of CSO facility SED02 with sampling points.

Figure S3. Sketch of CSO facility SED05 with sampling point.

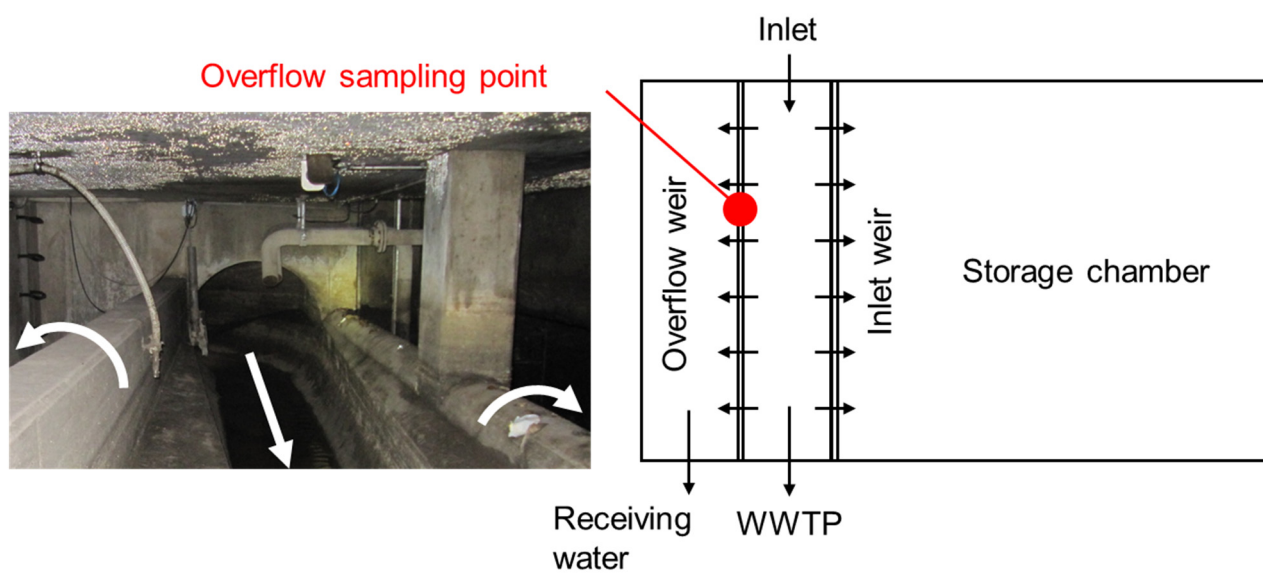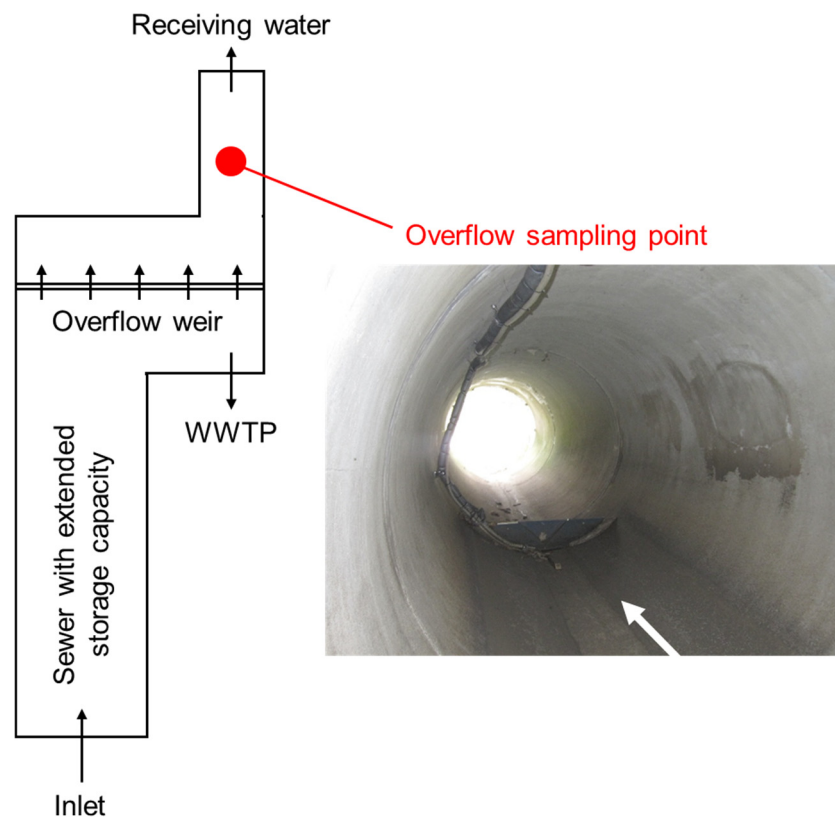**Figure S4.** Sketch of CSO facility FFR02 with sampling point.

Figure S5. Sketch of CSO facility SES02 with sampling point.

Figure S6. Scatterplots of EMCs derived from homogenized LVS samples (EMC$_{LVS,hom}$) and autosampler pollutographs (EMC$_{AS}$): (**a**) Chemical oxygen demand, (**b**) Conductivity, (**c**) Total nitrogen bound, (**d**) Total phosphorus. Dotted lines show 20% deviation.
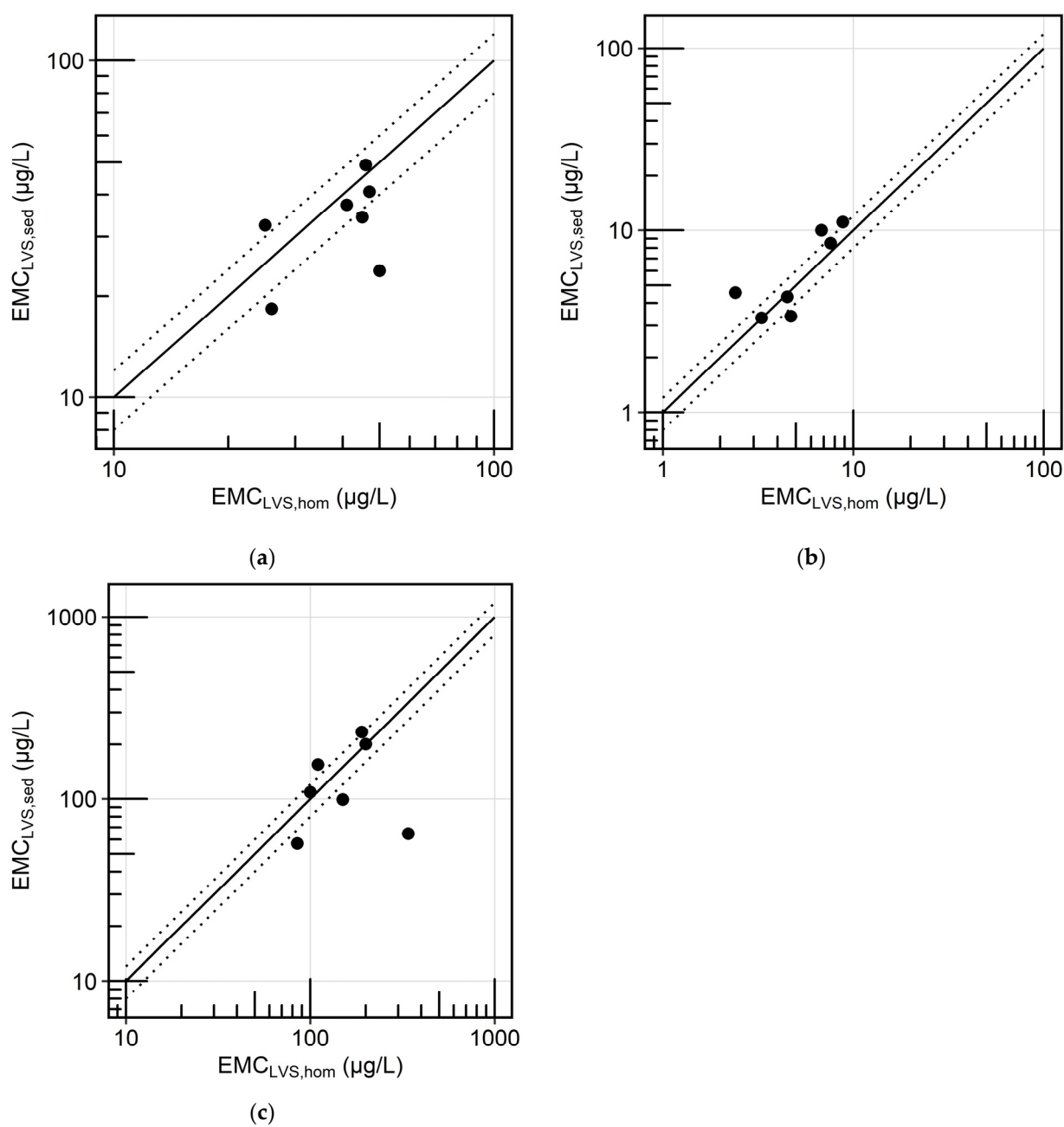
(**a**)

(**b**)

(**c**)

Figure S7. Scatterplots of EMCs derived from homogenized LVS samples (EMC$_{LVS,hom}$) and sedimented LVS samples (EMC$_{LVS,sed}$): (**a**) Copper, (**b**) Lead, (**c**) Zinc. EMC$_{LVS,sed}$ represent particulate pollutant concentrations only, EMC$_{LVS,hom}$ refer to the total content. Dotted lines show 20% deviation.

Table S1. Analytical methods used for water samples.

Parameter(s)	Analytical Method
Conductivity	EN 27888-C8
TSS	DIN 38409-H2
LOI	DIN 38409-H2
COD	DIN 38409-H41-H44
TNb	EN ISO 11905-1
TP, PO4-P	DIN 38405 D11-4
Metals	Inductively coupled plasma with mass spectrometry (ICP-MS) (DIN EN ISO 17294) after microwave digestion with addition of acid

Table S2. Analytical methods used for sediment samples.

Parameter(s)	Analytical Method
Sieving analysis	DIN 18123:2011-04
Dry mass	DIN 38409-H1
LOI	DIN 38409-H2
TP	DIN 38405 D11-4 (after perchloric acid digestion, in-house method)
Metals	Inductively coupled plasma with mass spectrometry (ICP-MS) (DIN EN ISO 17294) after microwave digestion with addition of acid

Table S3. Summary of analytical results of homogenized LVS samples.

Parameter	Unit	Inlet			Overflow		
		n	Median	Min-Max	n	Median	Min-Max
TSS	mg/l	5	77.0	45.0–137	20	43.3	16.3–109
TSS63	mg/l	5	50.4	23.3–108	20	30.1	6.5–82.4
LOI <63 μm	%	5	41	33–68	20	59	38–77
LOI 63–2,000 μm	%	5	65	57–82	20	69	49–88
pH	-	5	6.4	6.1–6.7	20	6.5	6.1–6.9
Conductivity	μS/cm	5	134	83–220	20	151	92–353
COD	mg/l	5	98.2	37–116	20	54.7	21.2–129
TNb	mg/l	5	Not analyzed		20	5.3	3.69–13.3
TP	mg/l	5	0.8	0.50–1.52	20	0.7	0.52–2.25
PO$_4$-P	mg/l	5	Not analyzed		20	0.3	0.22–1.33

Table S4. Summary of analytical results of sedimented LVS samples.

Parameter	Unit	Inlet			Overflow		
		n	Median	Min-Max	n	Median	Min-Max
TSS	mg/l	5	73.0	46.4–120	11	62.8	33.5–126
TSS63	mg/l	5	65.3	37.3–84.1	11	44.9	25.5–110
LOI <63 μm	%	5	36	22–49	11	41	27–55
LOI 63–2,000 μm	%	5	83	76–86	11	75	24–92
Supernatant							
pH	-	5	6.6	6.6–6.7	11	6.7	6.4–7.1
Conductivity	μS/cm	5	149	94–204	11	148	91–281
Particle-bound pollutants							
TP <63 μm	μg/mg	5	5.29	3.03–8.78	11	6.96	3.95–8.32
TP 63–2,000 μm	μg/mg	5	2.09	1.63–2.62	11	2.47	1.52–7.05
Cu <63 μm	μg/mg	5	0.34	0.24–0.42	11	0.48	0.26–0.85
Cu 63–2,000 μm	μg/mg	5	0.18	0.02–0.22	7	0.32	0.20–1.0
Pb <63 μm	μg/mg	5	0.078	0.070–0.097	11	0.09	0.058–0.12
Pb 63–2,000 μm	μg/mg	5	0.063	0.030–0.069	7	0.073	0.031–0.20
Zn <63 μm	μg/mg	5	1.10	0.82–1.70	11	1.90	0.032–2.5
Zn 63–2,000 μm	μg/mg	5	0.73	0.60–0.95	7	1.60	0.57–2.9

Table S5. Summary of analytical results of individual autosampler samples.

Parameter	Unit	Inlet			Overflow		
		n	Median	Min-Max	n	Median	Min-Max
TSS	mg/l	24	38.8	18–112	215	36.9	7.86–257
pH	-	24	6.4	6.3–6.6	215	6.5	6.2–7.1
Conductivity	μS/cm	24	97	73–147	215	143	2.4–436
COD	mg/l	24	38.2	30.3–119	215	47.1	11.5–257
TP	mg/l	24	0.6	0.44–1.58	215	0.8	0.27–9.49
TNb	mg/l	24	4	3.31–8.13	192	5.5	2.72–21.7

Table S6. Summary of analytical results of autosampler EMCs.

Parameter	Unit	Inlet			Overflow		
		n	Median	Min-Max	n	Median	Min-Max
TSS	mg/l	2	53.5	43.9–63.1	11	39.6	24.8–122
Conductivity	μS/cm	2	107	96.3–117	11	138	107–326
COD	mg/l	2	56.2	48.0–64.4	11	50.2	24.5–117
TP	mg/l	2	0.80	0.75–0.85	11	0.70	0.52–2.01
TNb	mg/l	2	5.1	4.5–5.7	10	5.5	3.6–14.9